



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,405	12/11/2003	Haochuan Jiang	GEMS8081.200	1404
27061	7590	08/10/2006	EXAMINER	
ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (GEMS)			SONG, HOON K	
14135 NORTH CEDARBURG ROAD			ART UNIT	
MEQUON, WI 53097			PAPER NUMBER	
			2882	

DATE MAILED: 08/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/707,405		JIANG ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Hoon Song		2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 08 May 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3,4,13-15,17-22 and 24-44 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,4,13-15,17-22 and 24-44 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3, 4, 13-14, 22, 24-25, 34-38 and 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsunota et al. (US 6495845B1) in view of Akai (US 5378894).

Regarding claim 1, Tsunota teaches a CT detector comprising:  
a scintillator array having a plurality of scintillators (2) and  
a reflector (4) interstitially disposed between at least two adjacent scintillators,  
the reflector including a light absorption element (3) disposed between a pair of  
reflective elements and

However, Tsunota fails to teach a reflective layer coated to a top face of the scintillator array.

Akai teaches a reflective layer (13) coated to a top face of a scintillator array (40) (figure 6).

It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the detector of Tsunota with the reflector as taught by Akai, since the reflector would further improve the sensitivity of the detector.

Regarding claim 3, Tsunota teaches the light absorption element is configured to reduce optical cross-talk between the at least two adjacent scintillators (table 4, column 7 line 50-65).

Regarding claim 4, Tsunota teaches the light absorption element is configured to substantially eliminate optical cross-talk between the at least two adjacent scintillators (table 4, column 7 line 50-65).

Regarding claim 13, Tsunota teaches the detector incorporated into a CT imaging system (column 10 line 65).

Regarding claim 14, Tsunota teaches the CT imaging system is configured to acquire radiographic data of a medical patient (CT, column 10 line 65).

Regarding claim 22, Tsunota teaches a method of CT detector manufacturing comprising the steps of: providing a scintillator array (2) of a plurality of scintillators, wherein the step of providing a scintillator array includes the step of forming a substrate of scintillation material (figure 1); disposing a reflective layer (4) between adjacent scintillators and disposing a composite layer (3) in the reflective layer.

However Tsunota fails to teach a method of disposing a reflective layer directly on an x-ray receptor surface of the scintillator array.

Akai teaches a method of disposing a reflective layer (13) directly on an x-ray receptor surface of a scintillator array (40) (figure 6).

It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the detector of Tsunota with the disposed reflector as taught by Akai, since the reflector would further improve the sensitivity of the detector.

Regarding claim 24, Tsunota teaches pixelating the substrate (figure 1).

Regarding claim 25, Tsunota teaches the step of pixelating includes at least one of chemically and mechanically forming gaps in the substrate to define a plurality of scintillators (figure 1).

Regarding claims 34, 36 and 37, Tsunota teaches a CT detector comprising:  
a scintillator array having a plurality of scintillators (2); and  
a reflector (4) interstitially disposed between at least two adjacent scintillators (2), the reflector including a light absorption element (3) disposed between a pair of reflective elements, wherein the light absorption element is configured to absorb x-rays, reduce x-ray punch through wherein, the light absorption element includes a high atomic number metal composite (column 8 line 40+).

However Tsunota fails to teach a reflective top coat cast on an x-ray receptor surface of each of the plurality of scintillators.

Akai teaches a reflective top coat cast (13) on an x-ray receptor surface of each of the plurality of scintillators (40) (figure 6).

It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the detector of Tsunota with the reflector as taught by Akai, since the reflector would further improve the sensitivity of the detector.

Regarding claim 35, Tsunota teaches the claimed invention except for the light absorption element is configured to absorb approximately 50% of the x-ray. It would have been obvious to one having ordinary skill in the art at the time the invention was made to configure to absorb 50% of x-ray, since it has been held that where the general

Art Unit: 2882

conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. Accordingly, one having ordinary skill in the art would be motivated to adapt the claimed absorption since it would further improve the cross-talk between the scintillator pixels.

Regarding claim 38, Tsunota teaches the metal composite includes a cured metal powder (sintered) and low viscosity polymer combination (resin).

Regarding claim 40, Tsunota teaches the metal composite includes tantalum (column 3 line 17).

Regarding claim 41, Tsunota teaches a CT detector comprising:

A scintillator array having a plurality of scintillators (2); and

A reflector (4) interstitially disposed between at least two adjacent scintillators, the reflector including a light absorption element disposed between a pair of reflective elements, wherein the pair of reflective elements includes  $\text{TiO}_2$ .

However Tsunota fails to teach a reflective top coat cast on an x-ray receptor surface of each of the plurality of scintillators.

Akai teaches a reflective top coat cast (13) on an x-ray receptor surface of each of the plurality of scintillators (40) (figure 6).

It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the detector of Tsunota with the reflector as taught by Akai, since the reflector would further improve the sensitivity of the detector.

Claims 15-21 and 42-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsieh et al. (US 6061419) in view of Tsunota et al. (US 6495845B1).

Regarding claims 15, 20 and 42-44, Hsieh teaches a CT system comprising:  
a rotatable gantry having a bore centrally disposed therein (figure 1);  
a table movable fore and aft through the bore and configured to position a subject for CT data acquisition (figure 1);

a high frequency electromagnetic energy projection source positioned within the rotatable gantry and configured to project high frequency electromagnetic energy toward the subject (figure 1); and

a detector array disposed within the rotatable gantry and frequency electromagnetic energy projected by the projection source and impinged by the subject, the detector array including (figure 1):

a scintillator array configured to illuminate upon reception of radiographic energy.

However Hsieh fails to teach the each reflector assembly includes a composite layer sandwiched between at least a pair of reflective layers; and wherein the composite layer includes a high-z metal and a low-viscosity polymer or reflective material including TiO<sub>2</sub> or each reflective layer having thickness of 15-90  $\mu\text{m}$  and the composite layer having thickness of 50-100  $\mu\text{m}$ .

Tsunota teaches a CT detector having the each reflector assembly includes a composite layer (3) sandwiched between at least a pair of reflective layers (4); and wherein the composite layer includes a high-z metal and a low-viscosity polymer (column 8 line 57), reflective material including TiO<sub>2</sub> (column 6 line 30-40 and column 8 line 57) and each reflective layer having thickness of 15-90  $\mu\text{m}$  and the composite layer having thickness of 50-100  $\mu\text{m}$  (column 6 line 30-40).



It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the CT detector of Hsieh with the reflector assembly as taught by Tsunota, since the device of Tsunota would reduce the cross-talk between the scintillators.

Regarding claim 17, Tsunota teaches the high Z-metal includes one of tungsten (column 8 line 57).

Regarding claim 18, Tsunota teaches the low-viscosity polymer has a non-translucent color (column 8 line 57).

Regarding claim 19, Tsunota teaches the at least a pair of reflective layers includes TiO<sub>2</sub> (column 8 line 57).

Regarding claim 21, Tsunota teaches the reflector assembly (4) is cast between adjacent scintillators (2) (figure 1).

Regarding claims 26-33, Tsunota fails to teach the claimed method of forming the scintillator.

The claimed method of forming is known in semiconductor forming art.

It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the method of forming scintillator of Tsunota with known forming method, since the method would accurately provide the scintillation pixel according to the detector pixel.

Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsunota.

Regarding claim 39, Tsunota fails to teach the polymer includes polyurethane.

Polyurethane is known for use of polymer material.



It would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to adapt polyurethane, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. Accordingly, one would be motivated to adapt the polyurethane because of its availability of manufacturing.

### ***Response to Arguments***

Regarding claims 1, 3, 4, 13-14, 22, 24-25, 34-38 and 40-41, the arguments have been considered but are moot in view of the new ground(s) of rejection.

Regarding claims 15-21 and 42-44, the argument lacks proper arguments. Applicant must discuss the references applied against the claims, explaining how the claims avoid the references or distinguish from them.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoon Song whose telephone number is (571) 272-2494. The examiner can normally be reached on 9:30 AM - 7 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on (571) 272 - 2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HKS

8/1/06  
HKS



EDWARD J. GLICK  
SUPERVISORY PATENT EXAMINER